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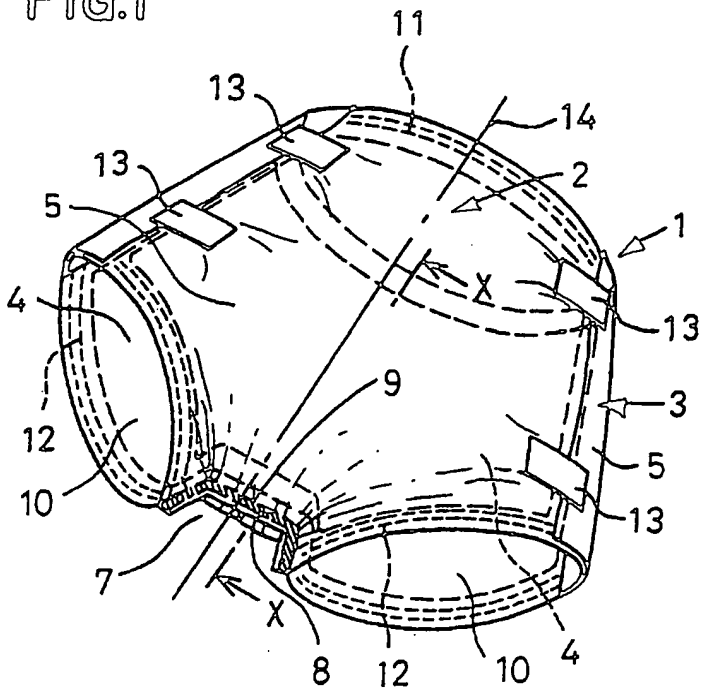
(54) Disposable diapers

(57) A disposable diaper comprising front and rear bodies 2, 3 separately formed and welded together along only respective lower ends of a crotch zone, and a breathability of said front body 2 being different from that of said rear body 3. The welded seam in the crotch zone is convexly curved towards the waist line. The laterally opposite side edges may be welded together to obtain a pants-type diaper.

FIG.1



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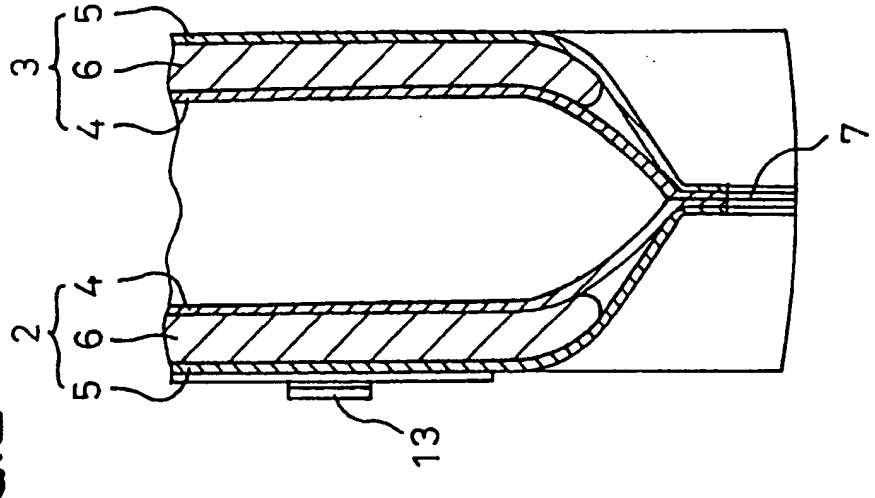

FIG.2

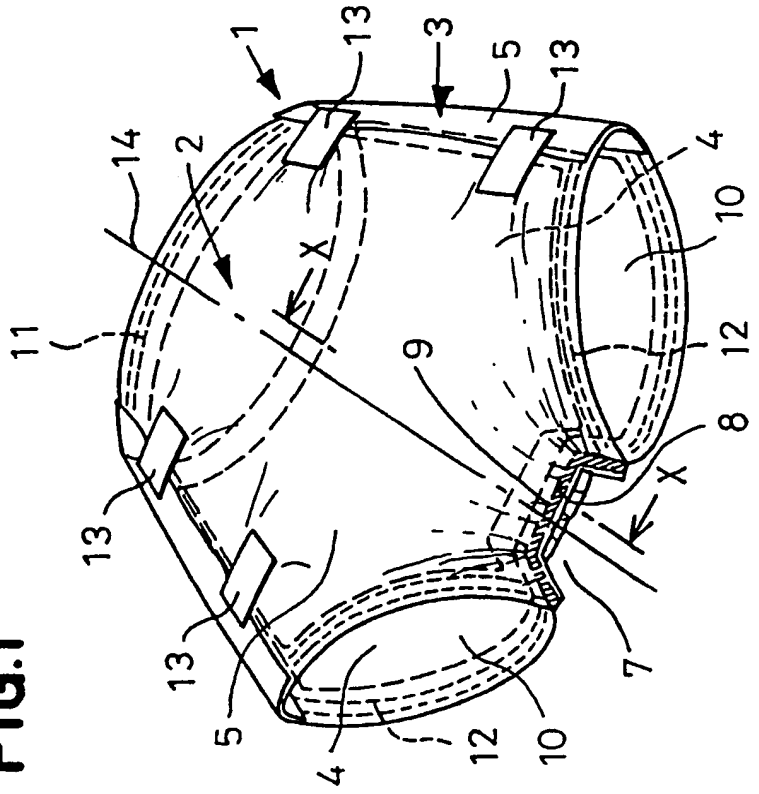

FIG.1

DISPOSABLE DIAPERS

The present invention relates to disposable diapers.

Conventionally, the typical disposable diapers employ moisture-permeable but liquid-impermeable film, for example, resinous film mixed with inorganic fine particles as a backsheet in order to eliminate or alleviate unpleasant stuffiness often experienced by diaper wearers.

Such backsheet has a moisture permeability in the order of 1500 to 3000 $g/m^2$24hs (ASTM E96-66) and a water pressure resistance of 1000 cmH_2O or higher (JIS L 1092). These values have been found to be sufficient for urine-impermeability but insufficient for a desired moisture-permeability. Therefore, stuffiness generated within the diaper can not be suppressed or alleviated by such backsheet to a desired level at which the wearers are not given any discomfort and substantially free from any adverse effect of stuffiness possibly causing a skin disease. The higher a moisture-permeability of the backsheet, the lower a liquid-impermeability thereof should be, resulting in leakage of liquid excretion. Confronting such an antinomic relationship, the highest priority is usually given to the liquid-impermeability.

A typical example of the open type disposable diaper

having tape fastener means used to fasten front and rear bodies to each other at the level of waist line is disclosed in Japanese Patent No. 1977-40267. This example comprises a liquid-permeable topsheet, a liquid-impermeable backsheet, and a liquid-absorbent panel sandwiched therebetween wherein a pair of side flaps are formed by portions of the top- and backsheets extending outward beyond laterally opposite sides of the panel and the respective side flaps are formed at a crotch level with cutouts destined to define leg-openings around which the respective side flaps are provided with elastic members serving to seal the side flaps around the respective legs of the wearer and wherein the rear body is provided at laterally opposite sides with tape fasteners used to fasten the rear body to the front body.

As the diaper disclosed by the above-identified Japanese Patent No. 1977-40267 is typical, the cutouts formed in opposite sides of the crotch zone for improved fitting of the diaper to the wearer's body necessarily reduce the width of the crotch zone and it is practically impossible for the crotch zone to surround the wearer's thighs. The crotch zone thus width-reduced inevitably decreases the ability of the crotch zone to absorb liquid excretion and to catch solid excretion, so leakage of excretion, particularly liquid excretion readily occurs

along opposite side edges of the crotch zone.

Generally in the well known diaper of the type as disclosed by the above-identified Japanese Patent, a fold line of the crotch zone corresponding to a boundary line of front and rear bodies horizontally extends in parallel to the waist line. In addition, the liquid-absorbent panel has so-called semi-rigidity, since it often comprises more or less compressed accumulation of fluff pulp and tissue paper covering top- and back surfaces of this accumulation. Accordingly, the crotch zone of the diaper can not get to fit the corresponding zone of the wearer's body, thus not only giving the wearer the feeling of incompatibility but also causing said leakage.

In view of the problem as mentioned above, it is a principal object of the invention to provide a disposable diaper comprising front and rear bodies separately formed and then welded together so as to solve above mentioned problem.

To achieve the object set forth above, the invention generally resides in a disposable diaper comprising a front body and a rear body separately formed, said front and rear bodies each comprising a liquid-permeable topsheet, a breathable but liquid-impermeable backsheet and a liquid-

absorbent panel sandwiched therebetween, said front and rear bodies being welded together only along respective lower ends of a crotch zone, and a breathability of said front body is different from that of said rear body.

Preferably, said front and rear bodies are welded together adjacent lower ends along a welding line convexly curved toward waist lines of said front and rear bodies so as to define said crotch zone.

Preferably, said front and rear bodies are partially cut away outside said crotch zone defined by said convexly curved welding line.

It should be understood that the backsheet in one of front and rear bodies having a breathability lower than that of the backsheet in the other body may not have a breathability at all within the scope of the invention.

According to the invention constructed as outlined above, ventilation between the diaper and outside air is achieved through the front body or the rear body including the backsheet having a higher breathability.

With the diaper put on the wearer, the convexly curved welding line is properly positioned on the crotch of the wearer and at least laterally opposite sides of the diaper's crotch zone cover insides of the wearer's thighs, namely, said crotch zone of the diaper covers substantially the entire crotch of the wearer.

The invention will be described by way of example with reference to the accompanying drawings, in which:

Fig. 1 is a front view showing an embodiment of a disposable diaper constructed according to the teachings of the invention; and

Fig. 2 is a sectional view taken along a line X-X in Fig. 1.

Referring to the drawings, a diaper 1 generally comprises front and rear bodies 2, 3. The rear body 3 is transversely dimensioned to be larger than the front body 2. Each of front and rear bodies 2, 3 comprises a liquid-permeable topsheet 4, a liquid-impermeable backsheet 5 and a liquid-absorbent panel 6 sandwiched between said top- and backsheets 4, 5.

Lower ends of front and rear bodies 2, 3 are formed at the middle positions with cutouts 7 convexly curved toward waist lines of front and rear bodies 2, 3. The front and rear bodies 2, 3 are welded together along a heat or supersonic welding line 8 extending in parallel with the cutouts 7 so as to leave narrow edges of the cutouts 7 not welded. Sizes, shapes and radiuses of curvature of the

welding line 8 may be appropriately selected depending on whether the diaper is for adult or for baby so far as the welding line 8 is convexly curved toward waist lines of front and rear bodies 2, 3 and at least inside portions of respective leg-openings 10 extend downward beyond an apex 9 of the convexly curved welding line 8.

Circumferentially stretchable elastic members 11, 12 are interposed between edges of top- and backsheets 4, 5 extending beyond the panel 6 around waist-opening and leg-openings, respectively, and said edges are closed together by hot melt type adhesive or said welding means. Laterally opposite side edges of top- and backsheets 4, 5 extending beyond the panel 6 are also closed together in the same manner and the rear body 3 is provided on laterally opposite side edges with a plurality of fastener means 13 each comprising a tape fastener applied on one side with pressure-sensitive adhesive, by which the laterally opposite sides of the rear body 3 are fastened to the corresponding sides of the front body 2.

While laterally opposite side edges and lower edges around the respective leg-openings of front and rear bodies 2, 3 are illustrated to extend neither in parallel with nor perpendicularly to a vertical axis 14, these side edges may extend in parallel with the vertical axis 14 and those lower edges around the respective leg-openings may extend

perpendicularly to said vertical axis 14 within the scope of the invention.

The diaper 1 is opened at the laterally opposite sides, therefore, at the waist-opening as well as the leg-openings also and, after erected with use of the fastener means as illustrated by Fig. 1, the laterally opposite sides are closed and, in consequence, the waist-opening as well as the leg-openings are also closed. Sizes of these openings depend on overlap width of front and rear bodies 2, 3 and the overlap width depends, in turn, on sizes of individual wearer's waist and legs (thighs). It is also possible to weld the laterally opposite side edges together to obtain pants type diaper and in such case no fastener means will be required.

The front body 2 or the rear body 3 uses the backsheet 5 having a breathability of 3 $cc/cm^2/sec$ or higher and a water pressure resistance of 50 cm H_2O or higher. Which of front and rear bodies 2, 3 should use the backsheet having such breathability and water pressure resistance depends on, for example, whether the diaper is for adult or for baby. In general, adult patients would lie face on and neither body weight nor significant water pressure resistance load exerted on the front body of diaper, so the backsheet having a higher breathability may be used in the front body to minimize or alleviate stuffiness possibly

generated within the diaper. On the other hand, some babies lie face up and some babies lie face down. For the latter case, the backsheet having a higher breathability may be used in the rear body.

As regards material of which the backsheet of higher breathability is made, it is preferred to employ hydrophobic nonwoven fabric of relatively high density, water repellence treated nonwoven fabric, plastic film formed with a plurality of fine pinholes, fine netty meshes or the like.

The other components of diaper may be those commonly used for the diaper of well known art. For example, the topsheet 4 may be made of nonwoven fabric, the backsheet 5 other than said highly breathable backsheet may be made of plastic film, the panel 6 may be made of fluff pulp mixed with superabsorbent polymer, the elastic members 11, 12 may be made of natural or synthetic rubber, and substrate of the fastener means 13 may be made of fine quality paper or laminate of nonwoven fabric and plastic film.

The disposable diaper constructed according to the invention as described hereinabove allows undesirable stuffiness that has been more or less generated within the diaper of prior art to be minimized or alleviated by selectively adjusting a breathability of front or rear body to be higher than that of the other body, depending on the

type of final article and simultaneously allows excretion leakage that has often occurred in the conventional diaper to be effectively avoided by said other body having a lower breathability.

According to the invention, the formation of the cutouts in opposite sides of the crotch zone so as to define the leg-openings never results in unacceptably narrow width of the crotch zone, since the welding line convexly curved toward the waist line allows a width of the crotch zone defined between the opposite side edges of the crotch zone to be dimensioned adequately large. In this manner, the crotch zone covers at least insides of the respective thighs sufficiently to improve its ability of absorption and thereby to prevent excretion from leaking along its edges around the respective thighs. Particularly in the case of open type diaper, provision of said convexly curved welding line allows the diaper to be properly put on the wearer, since the crotch zone of diaper gets to fit well the corresponding zone of the wearer's body.

CLAIMS

1. A disposable diaper comprising a front body and a rear body separately formed, said front and rear bodies each comprising a liquid-permeable topsheet, a breathable but liquid-impermeable backsheet, and a liquid-absorbent panel sandwiched therebetween, said front and rear bodies being welded together only along respective lower ends of a crotch zone, and a breathability of said front body is different from that of said rear body.

2. A disposable diaper according to Claim 1, wherein said front and rear bodies are welded together adjacent lower ends along a welding line convexly curved toward a waist line of said front and rear bodies so as to define said crotch zone.

3. A disposable diaper according to Claim 1, wherein said front and rear bodies are partially cut away outside said crotch zone defined by said convexly curved welding line.

4. A disposable diaper substantially as herein described with reference to the accompanying drawings.

Patents Act 1977 Examiner's report to the Comptroller under Section 17 (The Search report)	Application number GB 9317593.3
Relevant Technical Fields (i) UK Cl (Ed.L) A3V (ii) Int Cl (Ed.5) A61F	Search Examiner D BUCKLEY Date of completion of Search 26 OCTOBER 1993
Databases (see below) (i) UK Patent Office collections of GB, EP, WO and US patent specifications. (ii)	Documents considered relevant following a search in respect of Claims :- 1 TO 4

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&: Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages	Relevant to claim(s)
P,X	GB 2257347 A (UNI-CHARM) 13 January 1993, see especially, lines 14 to 17 of page 10	1

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